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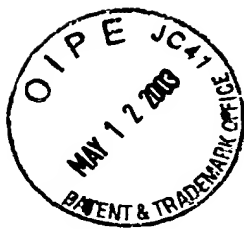
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[Designation of Document]      Specification  
[Title of the Invention]      CARGO HANDLING VEHICLE  
[Claims]

[Claim 1]    A cargo handling vehicle which can turn a body thereof, comprising mode switching means for switching over modes of operation between a normal running mode and a turning mode in which the body of said vehicle can be turned, wherein

              in said turning mode, the body is adapted to be turned about substantially a longitudinally and transversely central portion of cargo carrier tables for carrying cargo as a center of turn.

[Claim 2]    A cargo handling vehicle as set forth in Claim 1, wherein a wheel is set at a predetermined angle by operating a steering wheel so that the body turns about said center of turn.

[Claim 3]    A cargo handling vehicle as set forth in Claim 1, wherein said wheel is automatically set to said predetermined angle so that the body turns about said center of turn.

[Claim 4]    A cargo handling vehicle as set forth in any of Claims 1 to 3, wherein said cargo carrier tables are provided in such a manner as to freely extend in longitudinal directions of the body, and further comprising position detecting means for detecting a position to which said cargo carrier tables are moved relative to the body and center-of-turn position calculating means for calculating a center-of-turn position

of for the body based on the position of said cargo carrier tables detected by said position detecting means.

[Claim 5] A cargo handling vehicle which can turn a body thereof, comprising mode switching means for switching over modes of operation between a normal running mode and a turning mode in which the body of said vehicle can be turned, wherein

in said turning mode, the body is adapted to be turned about substantially a longitudinally and transversely central portion of cargo carrier tables for carrying cargo, and wherein

the mode of said cargo handling vehicle is switched over from said turning mode to said normal running mode when the turn of the body is completed and the body is prohibited from running until said wheels are restored to a condition in which the body is allowed to move straight.

[Claim 6] A cargo handling vehicle as set forth in Claim 5, further comprising information means for informing that the body is ready to run when said condition is restored in which the body is allowed to move straight.

[Claim 7] A cargo handling vehicle which can turn a body thereof, comprising mode switching means for switching over modes of operation between a normal running mode and a turning mode in which the body of said vehicle can be turned and center-of-turn selecting means for selecting a desired center of turn out of a plurality of centers of turn in said turning mode, wherein

the body is adapted to turn about a center of turn selected by said center-of-turn selecting means as a center of said turn.

[Detailed Description of the Invention]

[0001]

[Technical Field to which the Invention Belongs]

The present invention relates a cargo handling vehicle such as a forklift truck, and more particularly to a cargo handling vehicle which can turn a body thereof.

[0002]

[Prior Art]

A forklift truck is a cargo handling vehicle for carrying cargo placed on fork arms provided at the front of a body of the vehicle and the body can change its traveling direction or raise and/or lower the fork arms when an operator operates a steering wheel or associated levers. In a case where a forklift truck such as this is used to unload cargo, when cargo is loaded on a pallet, distal ends of the fork arms are inserted into insertion openings in the pallet so that the cargo is lifted together with the pallet and the pallet and cargo are transported to a target place, where the cargo is unloaded from the pallet. The empty pallet from which the cargo has been unloaded is then transported by the forklift truck to a predetermined place where the pallet so transported is then stacked on pallets which are stacked at the place for storage.

[0003]

Fig. 21 is a diagram showing a situation in which an empty pallet is transported by a forklift truck for stacking, and the forklift truck 100 and the pallets 40a, 40b are viewed from the top in the diagram. In the figure, reference numeral 1 denotes a body of the forklift truck 100, reference numerals 2a, 2b fork arms, respectively, provided left and right at the front of the body 1, reference numeral 3 a mast along which the fork arms 2a, 2b are raised and/or lowered, reference numeral 40a the pallet stacked at a predetermined place, and reference numeral 40b the pallet carried by the fork arms 2a, 2b of the forklift truck 100. Fig. 22 is a perspective view of the pallet 40a, 40b (represented by reference numeral 40), and the pallet 40 is constructed by assembling wood plates 42, and insertion holes 41 are formed between end beams 421 and a central beam 422, respectively, for insertion of the fork arms 2a, 2b thereinto.

[0004]

With the forklift truck 100 being now positioned as shown in Fig. 21(a) relative to the stacked pallet 40a, in order to place the pallet 40b carried by the fork arms 2a, 2b on the stacked pallet 40a in such a manner as to align with each other, the forklift truck 100 is then moved to a position where the pallet 40b overlaps the pallet 40a as shown in Fig. 21(b) and thereafter the pallet 40b is placed on the pallet 40a in an overlapped fashion.

[0005]

[Problems that the Invention is to Solve]

However, in order to move the forklift truck 100 from the position shown in Fig. 21(a) to the position shown in Fig. 21(b), the orientation of the body 1 has to be changed by manipulating the steering wheel and levers and the body 1 also has to be moved transversely and longitudinally. This makes it difficult for beginners to move the body to a desired position smoothly, and in particular in a case where the fork arms 2a, 2b are positioned close to the pallet 40a, the operations need to be repeated several times, and therefore, lots of time has to be spent unloading cargo. In addition, there is imposed a limitation to a range where the body 1 can be moved in a narrow space, and therefore, the implementation of the aforesaid operations becomes more inefficient.

[0006]

The present invention was made to solve the problems and an object thereof is to provide a cargo handling vehicle which allows even beginners to perform the pallet stacking operations efficiently and simply.

[0007]

[Means for Solving the Problems]

With a view to solving the problems, according to the invention, in addition to a normal running mode, there is provided a turning mode in which a body of a forklift truck

is turned, and the modes are designed to be switched over using a mode switching means. Then, in the turning mode, the body is designed to be turned about substantially a longitudinally and transversely central portion of cargo carrier tables for carrying cargo (Claim 1). According to the construction, since the body is turned about substantially a central portion of the pallet carried by the cargo carrier tables, the pallet carried by the cargo carrier tables can easily be stacked on stacked pallets in such a manner as to align therewith, thereby making it possible to reduce the time required for the stacking operations.

[0008]

In order for the body to turn as the center of turn about substantially the longitudinally and transversely central portion of the cargo carrier tables as described above, a wheel provided on the body needs to be set at a predetermined angle, and this setting may be manually performed by operating a steering wheel (Claim 2). Instead of operating the steering wheel, the wheel may automatically be set at the predetermined angle (Claim 3).

[0009]

In addition, in a cargo handling carrier like a reach forklift truck in which cargo carrier tables are provided in such a manner as to freely move in longitudinal directions of the body, since the center of turn needs to be changed depending



upon the position of the cargo carrier tables, there is provided a position detecting means for detecting a position to which the cargo carrier tables are moved relative to the body, and a center of turn for the body may be calculated based the position of the cargo carrier tables detected by the position detecting means (Claim 4).

[0010]

Furthermore, according to the invention, the operation mode is switched over from the turning mode back to the running mode after the turn of the body has been completed, and the body is prohibited from running until the wheel is returned to a state in which the body gets ready to move straight (Claim 5). According to the construction, the body is prevented from starting to run in an unexpected direction. As this occurs, there may be provided an information means for informing that the body is ready to run when the body has put in the state in which the body is ready to move straight (Claim 6).

[0011]

In addition, according to the invention, a center of turn may be selected out of a plurality of centers of turn, so that the body turns as the center of turn about the center of turn so selected. As this occurs, the center of turn may be set depending upon types of operations such as cargo unloading and pallet stacking operations (Claim 7).

[0012]

[Mode for Carrying out the Invention]

Fig. 1 shows a reach forklift truck which is one embodiment of the invention. In the figure, reference numeral 100 denotes a reach forklift truck (hereinafter, referred to simply as a forklift truck) as a cargo handling vehicle, 1 a body of the forklift truck 100, 2a, 2b fork arms provided left and right at the front of the body 1 as cargo carrier tables, 3 a mast for raising and/or lowering the fork arms 2a, 2b, and 4 a steering wheel for changing the traveling direction of the body 1. Reference numeral 50 denotes a straddle arm constituting a part of the body 1, 51 an operator's seat where the operator (or the driver) can operate the vehicle while standing thereat, 52 operation levers used to run the body 1 and/or raise and/or lower the fork arms 2a, 2b, and 53 a head guard provided above the operator's seat 51 for protecting the operator against falling matters. Reference numeral 5b denotes a road wheel provided at the front of the body, 8 a driving wheel provided at the rear of the body, and 14 a display panel provided at the front of the operator's seat 51.

[0013]

Fig. 2 is a diagram showing the construction of a main part of the forklift truck 100 as a plan view. In the figure, like reference numerals are given to portions like to those shown in Fig. 1. A pair of road wheels 5a, 5b are provided at the front of the body and steering motors 6a, 6b are provided

for turning the road wheels, respectively. In addition, angle sensors 7a, 7b are provided for the steering motors for detecting the turning angle of the road wheels, respectively. Reference numeral 9 denotes a steering motor adapted to interlock with the operation of the steering wheel 4 for rotation to assist the driving wheel 8 in turning, 10 an angle sensor for detecting the turning angle of the driving wheel 8. Reference numeral 11 denotes a caster wheel adapted to turn freely in every direction. Reference numeral 12 denotes a potentiometer as a position detecting means for detecting the position of fork arms 2a, 2b, 13 a controller for controlling the respective parts and 14 the display panel which has been described previously.

[0014]

Fig. 3 is a block diagram showing the electrical configuration of the aforesaid forklift truck 100, and like reference numerals are imparted to portions like to those described with reference to Fig. 2. Shown in the figure are blocks only which are related to the invention, and the steering motor 9 and the angle sensor 10 for the driving wheel 8, the other motors, the operation levers, various switches and the like are therefore omitted. A mode switching switch 20 constitutes a mode switching means according to the invention, and an information device 22 constitutes an information means of the invention. In addition, the controller 13 constitutes

a center-of-turn position calculating means according to the invention. A stacking mode switch 28 is, as will be described later, a switch for turning the body 1 in performing a pallet stacking operation and constitutes a part of a center-of-turn selecting means of the invention.

[0015]

Fig. 4 illustrates an example of an initial screen appearing on the display panel 14. Provided on the display panel 14 are a running mode switch 23 for selecting a normal running mode and a turning mode switch 24 for selecting a turning mode, and the mode switching switch 20 shown in Fig. 3 is constituted by these switches 23, 24. Reference numeral 25 denotes an information display part for displaying various types of pieces of information.

[0016]

In Fig. 4, when the running mode switch 23 is depressed, the screen of the display panel 14 is switched over to a running mode screen such as shown in Fig. 5. Displayed on this screen is a running direction selecting switch 26 for selecting a running direction for the forklift truck 100. When any of directions shown under the running direction selecting switch 26 is depressed, characters or symbols indicating an associated steering wheel operation are displayed in the information display part 25, but it is not the main part of the invention, and therefore the detailed description thereof is omitted here.

[0017]

In Fig. 4, when the turning mode switch 24 is depressed, the screen of the display panel 14 is switched over to a turning mode screen such as shown in Fig. 6. Displayed on this screen is an unloading mode switch 21 in addition to the stacking mode switch 28 shown in Fig. 3 as a switch for selecting a center of turn for the forklift truck 100. These switches 21, 28 constitute the center-of-turn selecting. The unloading mode switch 21 is constructed so as to select three positions such as "right," "left," and "center" as the center of turn of the forklift truck 100, and there are provided a total of three center-of-turn selecting switches 21a to 21c which correspond to those three positions, respectively. Reference numeral 29 denotes a standard mode switch for switching the operation mode from the turning mode back to the normal running mode for preparing a condition (a standard mode) in which the vehicle is ready to move straight. This standard mode switch 29 constitutes the mode switching switch of the invention together with the switches 23, 24 shown in Fig. 4.

[0018]

Figs. 7 and 8 both illustrate examples of screens displayed in the information display part 25 after the unloading mode switch 21 is depressed, and examples of screens displayed in the information display part 25 after the stacking mode switch 28 is depressed. These screens will be described in detail

later.

[0019]

Next, a procedure of stacking pallets will be described. Note that pallets 40a, 40b to be handled below are identical to those shown in Fig. 22. As shown in Fig. 12, the forklift truck 100 carrying the pallet 40b by inserting the fork arms 2a, 2b into the insertion holes 41 therein is caused to run straight toward the pallet 40a stacked at a predetermined place and is stopped, as shown in Fig. 13, at a position where the centers of the pallets 40b and 40a substantially coincide with each other. Thereafter, the operation mode is switched from the running mode to the turning mode, so that the body 1 is set to a state in which the body 1 can turn in a direction indicated by an arrow Y about a point P shown in Fig. 14 as the center of turn. This will be described in detail later.

[0020]

Fig. 11 is a flowchart illustrating a procedure of turning the forklift truck 100. Firstly, in the initial screen on the display panel 14 shown in Fig. 4, when the mode switching switch 20 is depressed (step S1), it is decided which switch has been depressed (step S2). In the event that the running mode switch 23 is depressed (step S2; NO), the operation mode is shifted to the normal running operation, whereas when the turning mode switch 24 is depressed (step S2; YES), the turning mode screen shown in Fig. 6 is displayed on the display panel 14 (step S3).

[0021]

Next, the stacking mode switch 28 is depressed on the screen in Fig. 6 (step S4), what is selected is then read in the controller 13, which determines a center of turn for the stacking mode based on data stored in a memory (not shown) in advance (step S5). Following this, a steering wheel operation guide message 31 shown in Fig. 9 is displayed in the information display part 25 in the display panel 14 using characters and graphics (step S6).

[0022]

When the operator follows the operation guide message 31 and turns the steering wheel 4 (turns clockwise in this example), the driving wheel 8 turns while interlocking with the steering wheel 4 (step S7). Whether or not the driving wheel 8 has turned to a predetermined angle set in advance is determined by looking at an output from the angle sensor 10 (step S8), and in the event that the driving wheel 8 has not yet turned to the set position (step S8; NO), the steering wheel 8 continues to be operated (step S7). When the driving wheel 8 has turned to the set position (step S8; YES), then the road wheels 5a, 5b are turned to set positions (step S9). Turning the road wheels is automatically carried out by the steering motors 6a, 6b. Namely, while monitoring outputs from the angle sensors 7a, 7b, the controller 13 continues to drive the steering motors 6a, 6b until the road wheels 5a, 5b are turned to the

predetermined angles set in advance. When the road wheels 5a, 5b are turned to the set positions, a mode setting completion screen such as shown in Fig. 10 is displayed in the information display part 25 (step S10), thereby informing that the center of turn for the stacking mode has been selected. Shown on this screen are a mode 34 and graphics 35 showing the orientations of the respective wheels.

[0023]

In this state, the center of turn and the respective wheels are set as shown in Fig. 14. Namely, the center of turn P is set substantially at a longitudinally and transversely central portion of the fork arms 2a, 2b in such a manner as to align substantially with the center of the pallet 40b. In addition, the road wheel 5a is set in an orientation in which it follows along a circumference R1 with a radius  $r_1$  that would be formed about the center of turn P, the road wheel 5b is set in an orientation in which it follows along a circumference R2 with a radius  $r_2$  that would be formed about the center of turn P, and the driving wheel 8 is set in an orientation in which it follows along a circumference R3 with a radius  $r_3$  that would be formed about the center of turn P.

[0024]

Consequently, when a running motor (not shown) is rotated to drive the driving wheel 8 from this state, the road wheels 5a, 5b and the driving wheel 8 start to move along the



circumferences that would be formed about the center of turn B as the center thereof, whereby the body 1 turns in the direction indicated by the arrow Y (or turns in an opposite direction to the direction indicated by the arrow Y) about the center of turn B as a center of such a turn. Then, when the pallet 40b comes to a position shown in Fig. 15 where the pallet 40b overlaps the pallet 40a, the body 1 is stopped turning. Next, the fork arms 2a, 2b are lowered from the condition shown in Fig. 15 by operating the operation levers 52 (Fig. 1), the pallet 40b is placed over the pallet 40a in alignment with each other, the stacking operation being thereby completed. Thereafter, the operation mode is switched from the running mode to the standard mode in the running mode by depressing a standard mode switch 29 (Fig. 6) on the display panel 14, and as shown in Fig. 16, the turning angles of the road wheels 5a, 5b and the driving wheel 8 are returned to zero, whereby the body 1 can move straight rearward.

[0025]

Thus, according to the embodiment, since the body 1 turns about substantially the central portion of the pallet 40b as the center of turn, if the forklift truck 100 continues to be run to the position where the center of the pallet 40b overlaps substantially the center of the pallet 40a, irrespective of the orientation of the body 1, the pallet 40b can easily be overlapped on the pallet 40a b by turning the body 1.

Consequently, even beginners can perform the operation of stacking pallets within a short period of time, the efficiency of the pallet stacking operation being thereby improved.

[0026]

Next, the operation of the unloading mode will be described in which cargo loaded on the pallet is unloaded. In the event that the switch 21a of the unloading mode switch 21 is depressed, as shown in Fig. 17(a), the orientations of the road wheels 5a, 5b and the driving wheel 8 are set such that a distal end A of the right fork arm 2a becomes the center of turn, and the body 1 turns in a direction indicated by an arrow Y about the distal end A of the fork arm 2a. In addition, in the event that the switch 21b of the unloading mode switch 21 is depressed, as shown in Fig. 17(b), the orientations of the road wheels 5a, 5b and the driving wheel 8 are set such that a distal end B of the right fork arm 2b becomes the center of turn, and the body 1 turns in a direction indicated by an arrow Y about the distal end B of the fork arm 2b. Additionally, in the event that the switch 21c is depressed, although not shown, the orientations of the respective wheels are set such that a central portion of a line connecting the distal ends A, B becomes the center of turn, and the body 1 turns about the central portion as the center of turn.

[0027]

In either case, when the unloading mode switch 21 is

depressed, a steering wheel operation guiding message 31 as shown in Fig. 7 is displayed in the information display part 25 in the display panel 14 (a case is shown in which the switch 21b is depressed). Similarly to the case described with reference to Fig. 14, when by turning steering wheel 4 the driving wheel 8 is set in an orientation in which it follows along a circumference that would be formed about the center of turn by the driving wheel 8 and the road wheels 5a, 5b are set in orientations in which they follow along circumferences that would be formed about the center of turn, a mode setting completion screen as shown in Fig. 8 is displayed in the information display part 25, whereby it is informed that the center of turn for the unloading mode has been set. Displayed on this screen are graphics 33 illustrating the mode, the center of turn 32 and the orientations of the wheels. The body 1 can easily be positioned in front of the pallet 40 on which cargo is loaded by turning the body 1 as has been described heretofore, whereby the cargo can easily be unloaded by allowing the fork arms 2a, 2b to be inserted into the insertion holes 41.

[0028]

As has been described heretofore, the center of turn of the forklift truck 100 may be selected to purposes by providing the unloading mode switch 21 in addition to the stacking mode switch 28, whereby the forklift truck can be made to cope with both the unloading and stacking operations.

[0029]

Incidentally, while in the example shown in Fig. 11, after the center of turn is determined by depressing the stacking mode switch 28 the operator manually operates the steering wheel 4 in accordance with the steering wheel operation guide displayed in the display panel 14 so as to turn the driving wheel 8 to the predetermined angle, the series of operations can automatically be performed. Fig. 18 shows a flowchart for such an automatic operation, and like reference numerals are given to portions like to those described with reference to Fig. 11.

[0030]

In Fig. 18, when the mode switching switch 20 on the display panel 14 is depressed (step S1), it is decided which switch has been depressed (step S2), and in the event that the turning mode switch 24 is depressed, the turning mode screen is displayed in the display panel 14 (step S3). When the stacking mode switch 28 is depressed (step S4), the controller 13 determines the center of turn (step S5). This series of operations is totally identical to that described while referring to Fig. 11.

[0031]

Next, the driving wheel 8 is turned based on the center of turn so determined until the driving wheel 8 is oriented so as to follow along a circumference that would be formed about the point P (step S8a). Another steering motor (not shown) is provided in addition to the steering motor 9 for this purpose.

Then, while monitoring the turning angle of the driving wheel 8 through the angle sensor 10, the controller 13 drives the steering motor, and the motor is stopped when the turning angle of the driving wheel reaches a set value. Thereafter, similarly to the case described with reference to Fig. 11, the road wheels 5a, 5b are turned to the set positions (step S9) by means of the steering motors 6a, 6b, and after the turn of the road wheels is completed the mode setting completion screen shown in Fig. 10 is displayed in the information display part 25 (step S10).  
[0032]

According to the embodiment shown in Fig. 18, only by depressing the stacking mode switch 28 the driving wheel 8 and the road wheels 5a, 5b are automatically turned and the body 1 is set ready to turn about the point P, and therefore the load borne by the operator in operating the forklift truck 100 in this way can be reduced further.  
[0033]

Incidentally, in a case where the forklift truck 100 is a reach forklift truck, since the fork arms 2a, 2b are provided in such a manner as to freely move in the longitudinal directions of the body 1, the position of the point P relative to the body 1 varies to a reach-in condition shown in Fig. 19(a) and a reach-out condition shown in Fig. 19(b), respectively. To cope with this, as a further embodiment of the invention, it can be contemplated that the center of turn is determined based

on the position of the fork arms 2a, 2b which have been moved relative to the body 1.

[0034]

In this case, the position of the fork arms 2a, 2b can be detected by the potentiometer 12 (Figs. 2, 3) for detecting the position of the fork arms. To describe a specific constitution that can be contemplated therefor, for example, one end of a wire (not shown) is connected to a lower end of the mast 3, and the other end of the wire is taken up around a take-up reel (not shown) provided on the body 1, so that the number of times of turns of the take-up reel which turns in association with the movement of the mast is detected by the potentiometer 12. An encoder may be used as the fork arm position detecting means instead of the potentiometer 12.

[0035]

The controller 13 calculates a center of turn for the body 1 based on the position of the fork arms 2a, 2b so detected and sets the road wheels 5a, 5b and the driving wheel 8 such that they are oriented so as to follow circumferences that would be formed about the center of turn P. According to the construction, the center of turn can accurately be determined irrespective of the position of the fork arms 2a, 2b.

[0036]

In addition, a device (for example, a potentiometer) detecting transverse positions of the fork arms may be provided

for a forklift truck in which the two fork arms can be moved transversely in opposite directions so as to freely verify the space therebetween and a forklift truck in which the two fork arms can be moved in the same direction with the space between the fork arms being kept constant, and when the fork arms are moved transversely, outputs from the detecting device so provided are used as operation elements to suitably determine the center of turn.

[0037]

Incidentally, after the body 1 has been set ready to turn, as has been described before, the running motor is driven to turn the body 1 and is then stopped when the body 1 has turned to a position where the pallet 40b overlaps the pallet 40a (Fig. 15). However, in a case where the forklift truck 100 is moved backward after the cargo has been unloaded, the body 1 has to be ready to move straight (Fig. 16). However, if the operator is being careless to fail to switch the operation mode from the turning mode back to the running mode, or if the operator starts to run the vehicle before the respective wheels have not been returned to the state in which the vehicle is ready to move straight even after he or she has switched the operation mode back to the running mode, there would be caused a risk of the body 1 being caused to turn or to start to move in an unexpected direction, resulting in an extremely dangerous situation.

[0038]

To cope with this or to avoid the risk resulting in the dangerous situation, it is desirable to prohibit the body 1 from starting to run until the operation mode has been switched from the turning mode back to the running mode after the turn of the body has been completed and the wheels have been returned to the state where the body 1 is allowed to move straight.

[0039]

Fig. 20 is a flowchart showing a procedure for such a case. Firstly, the body 1 is turned (step S31), and when the turn is completed (step S32; YES), the fork arms 2a, 2b are lowered to perform a pallet stacking operation (step S33). When the stacking operation is completed (step S34; YES), whether or not the operation mode has been switched from the turning mode back to the running mode is determined (step S35). If the operation mode has not yet been switched back to the running mode, wait until the switching back of the operation mode is completed (step S35; NO), and if the operation mode is switched back to the running mode (step S35; YES), an electromagnetic brake of the running motor is activated so as to prohibit the body from running (step S36). Thereafter, the road wheels 5a, 5b and the driving wheel 8 are returned to the straight conditions shown in Fig. 16 (in which the turning angles thereof are zero) (step S37).

[0040]



When the respective wheels are returned to the straight conditions, the body 1 gets ready to move straight (step S38; YES), and at this point in time the information device (Fig. 3) informs the operator that the forklift truck 100 gets ready to run (step S39). This information device is constituted by, for example, a buzzer and even if a running operation is carried out before the buzzer is activated, the body 1 does not start. When the operator carries out a rearward running operation upon hearing the sound of the buzzer activated (step S40), the body 1 starts to move straight rearward (step S41). Note that a chime may be used for the information device 22 instead of the buzzer. In addition, instead of or in addition to the information by sound using the information device 22, a message informing that running is permitted may be displayed on the display panel 14. As this occurs, the display panel 14 constitutes the information means according to the invention.

[0041]

Thus, according to the embodiment shown in Fig. 20, since the operation mode is switched back to the running mode after the turn of the body is completed (step S35) and the body 1 is allowed to run on condition that the respective wheels are returned to the condition in which the straight running is permitted (step S38), the safety is ensured by preventing the body 1 from being caused to turn or to start to run in an unexpected direction due to carelessness of the operator. In addition,

since the information is given by sound or display that the forklift truck gets ready to run, the operator is allowed to perform the running operation in a smooth fashion.

[0042]

While the fork arms have been described as in the case where two fork arms are used in the above embodiments, the invention may be applied to a cargo handling vehicle employing three or more fork arms.

[0043]

[Effectiveness of the Invention]

According to the invention, since the body can easily be turned about the longitudinally and transversely central portion of the cargo carrier tables, even beginners can carry out operations of stacking a pallet carried on the cargo carrier tables on a pallet stacked efficiently within a short period of time.

[Brief Description of the Drawings]

[Fig. 1] A perspective view of a reach forklift truck according to one embodiment of the invention.

[Fig. 2] A plan view illustrating the constitution of a main part of the forklift truck.

[Fig. 3] A block diagram showing the electrical configuration of the forklift truck.

[Fig. 4] A diagram showing an example of an initial screen in a display panel.

[Fig. 5] A diagram showing an example of a running mode screen.

[Fig. 6] A diagram showing an example of a turning mode screen.

[Fig. 7] A diagram showing an example of a screen displayed in an information display part.

[Fig. 8] A diagram showing another example of a screen displayed in the information display part.

[Fig. 9] A diagram showing an example of a screen displayed in the information display part.

[Fig. 10] A diagram showing another example of a screen displayed in the information display part.

[Fig. 11] A flowchart illustrating a procedure of turning the forklift truck.

[Fig. 12] A diagram explaining a stacking operation.

[Fig. 13] A diagram explaining another stacking operation.

[Fig. 14] A diagram explaining a further stacking operation.

[Fig. 15] A diagram explaining a stacking operation.

[Fig. 16] A diagram explaining another stacking operation.

[Fig. 17] A diagram illustrating a flowchart of carrying out an unloading operation.

[Fig. 18] A flowchart associated with another embodiment of the invention.

[Fig. 19] A diagram explaining reach-out and reach-in of fork arms.

[Fig. 20] A flowchart associated with a further embodiment of the invention.

[Fig. 21] A diagram explaining a stacking operation according to a conventional forklift truck.

[Fig. 22] A perspective view of a pallet.

[Description of Reference Numerals and Characters]

1: body; 2a, 2b: fork arm; 3: mast; 4: steering wheel; 5a, 5b: roadwheel; 8: driving wheel; 12: potentiometer; 13: controller; 14: display panel; 20: mode switching switch; 21: unloading mode switch; 22: information device; 28: stacking mode switch; 40a, 40b: pallet; P: center of turn; 100: forklift truck.

[Designation of Document]      Abstract

[Summary]

[Problem]      To provide a cargo handling vehicle which allows even beginners to perform stacking operations efficiently and simply.

[Means for Solving the Problem]      Separately from a normal running mode, there is provided a turning mode in which a body 1 is allowed to turn. In the turning mode, road wheels 5a, 5b and a driving wheel 8 are set such that the wheels are oriented so as to follow along a circumference R1 to R3 that would be formed about a center of turn P. The center of turn P is set at substantially a longitudinally and transversely central portion of fork farms 2a, 3b. As a result of this, the body 1 is allowed to turn about substantially the central portion of a pallet 40b carried thereby, whereby an operation can simply be carried out in which the pallet 40b overlaps a pallet 40a in such a manner that the pallets are aligned with each other.

[Selected Figure]      Fig. 14



FIG. 1

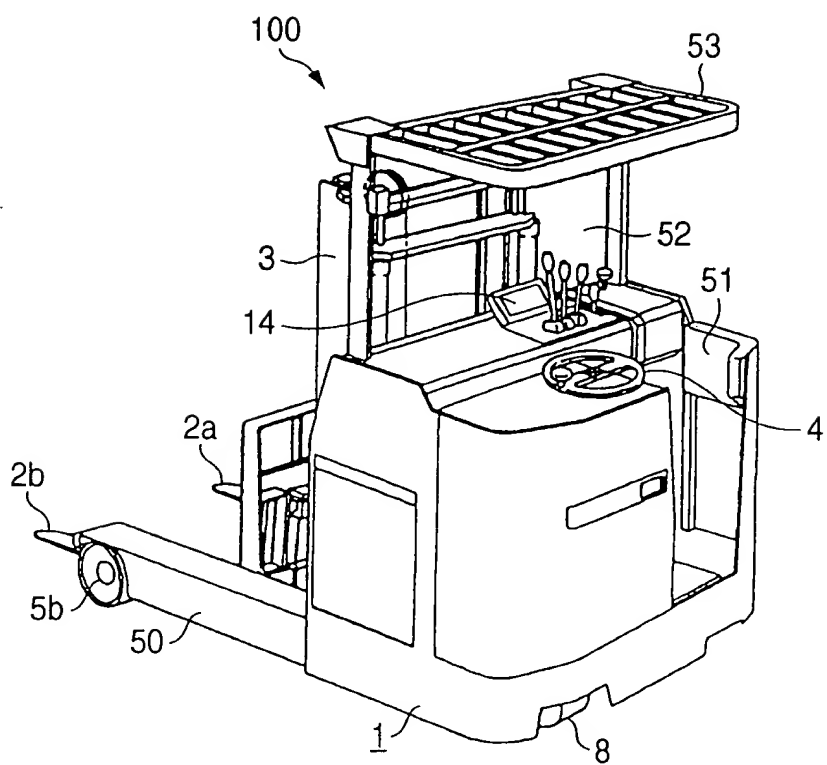




FIG. 2

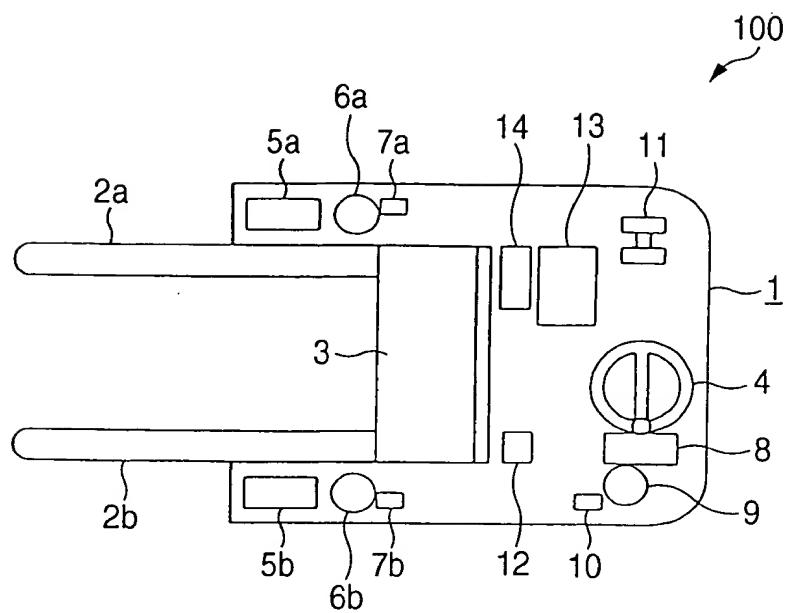




FIG. 3

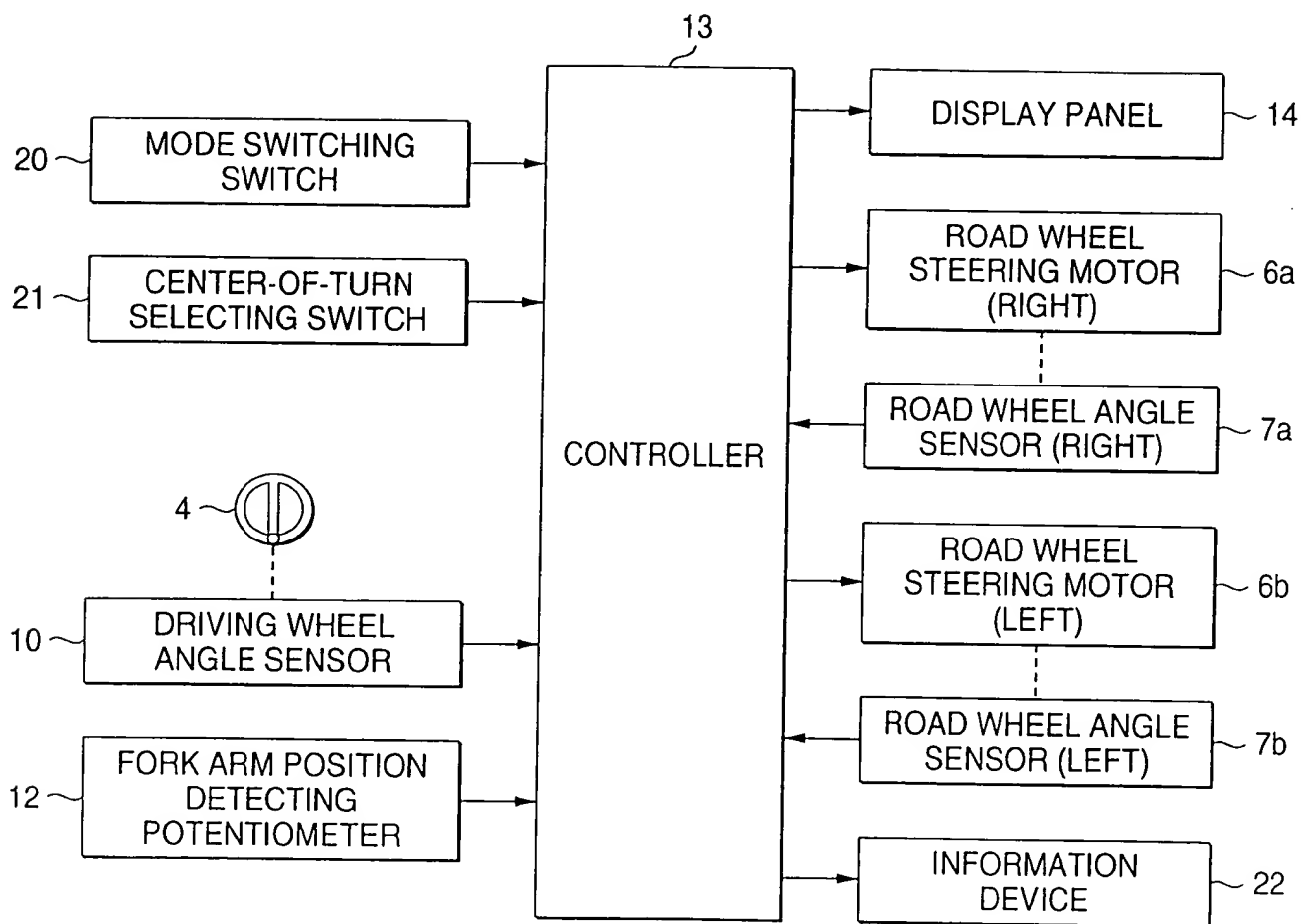




FIG. 4

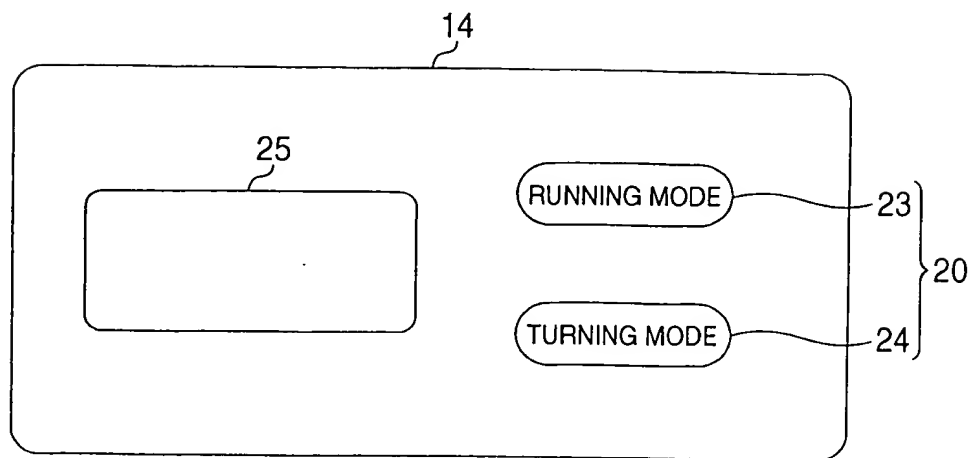


FIG. 5

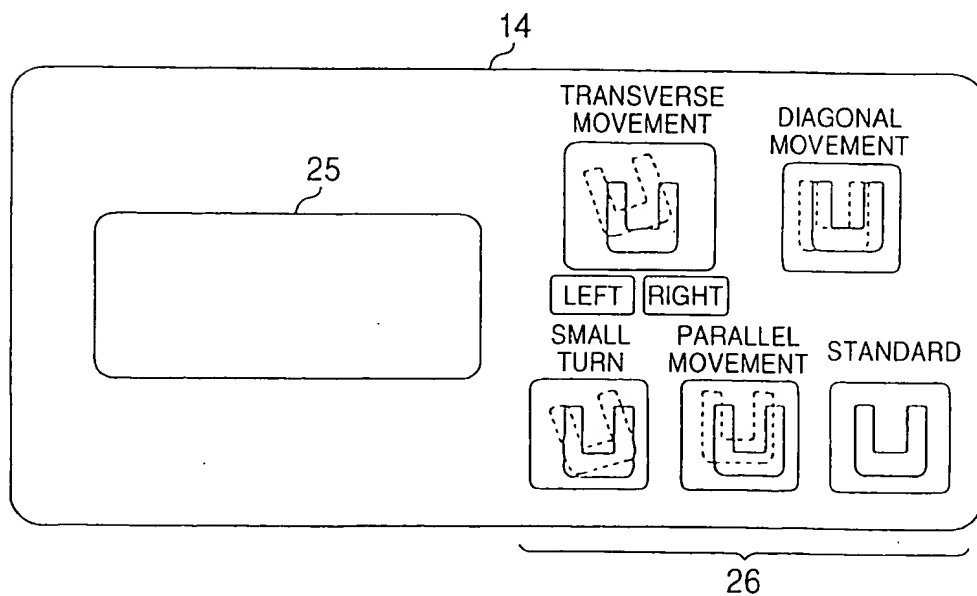




FIG. 6

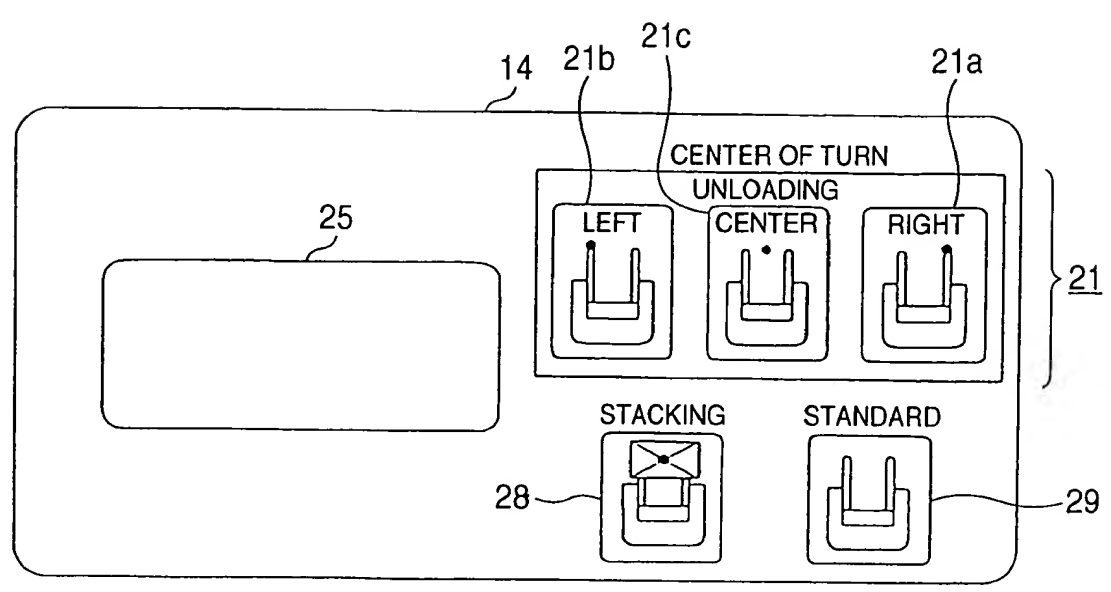


FIG. 7

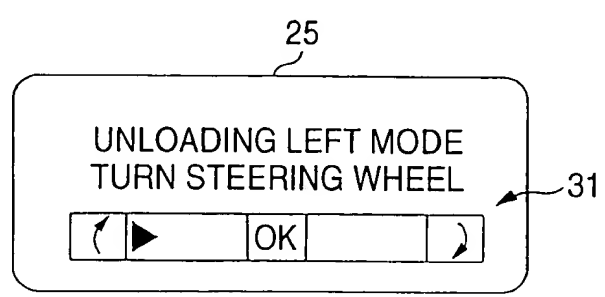


FIG. 8

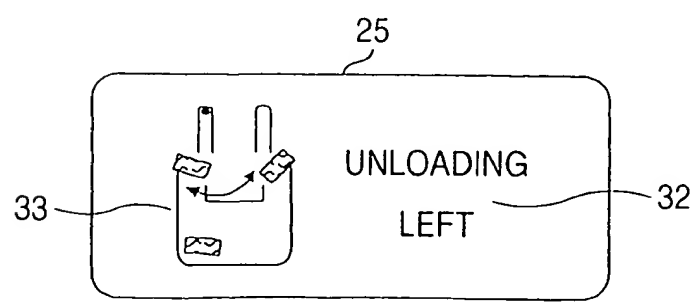




FIG. 9

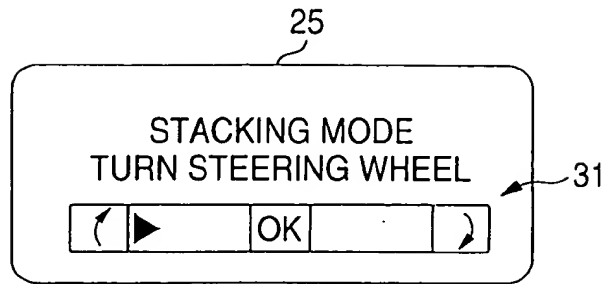


FIG. 10

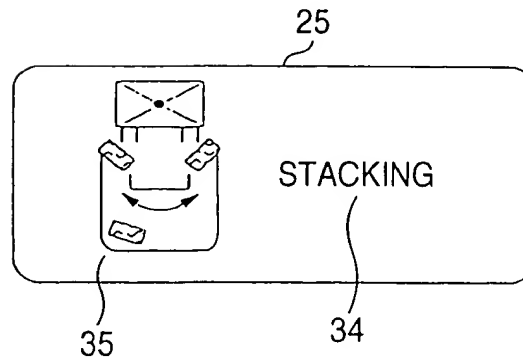




FIG. 11

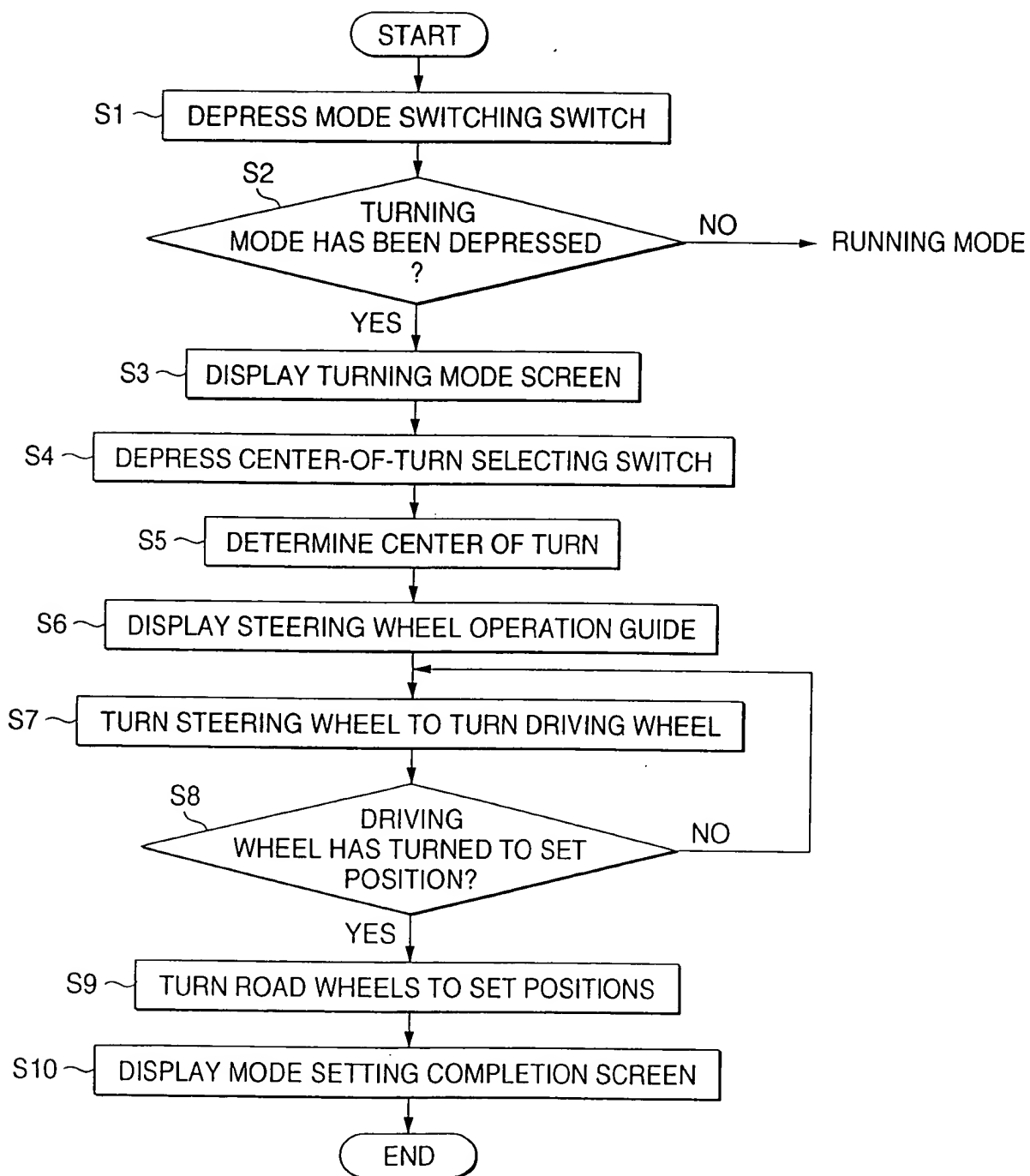




FIG. 12

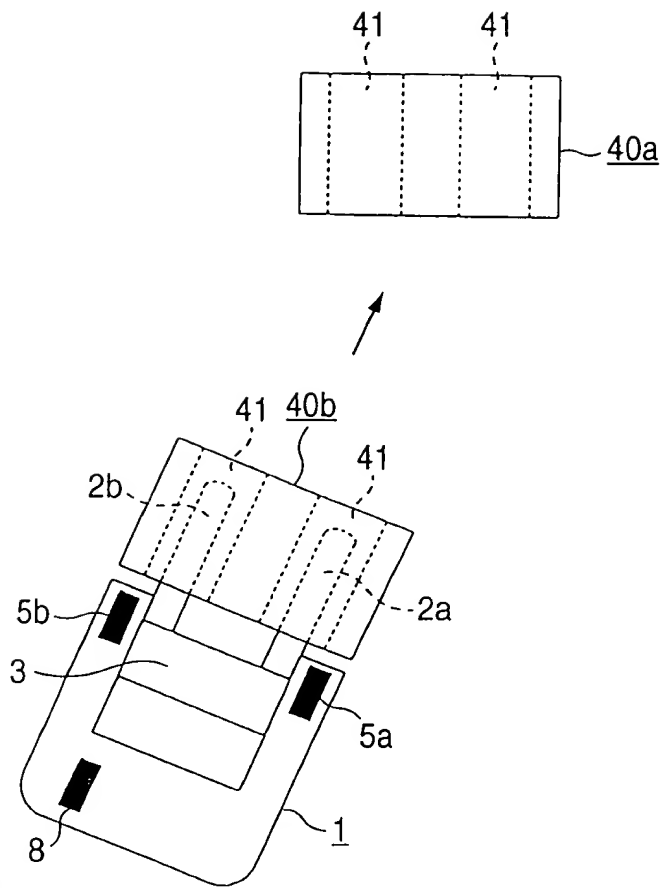


FIG. 13

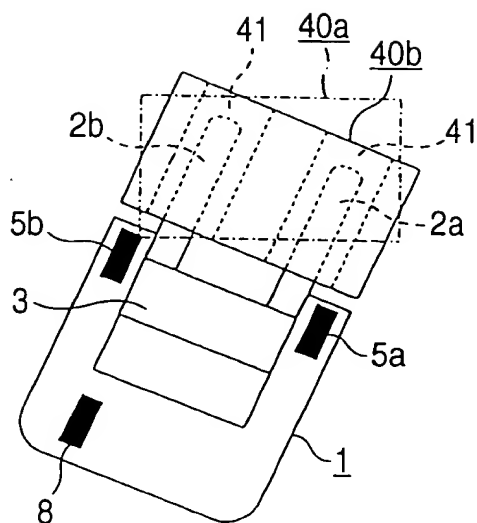


FIG. 14

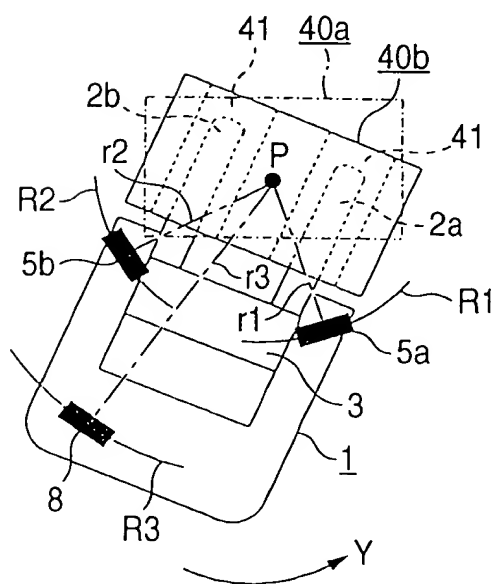


FIG. 15

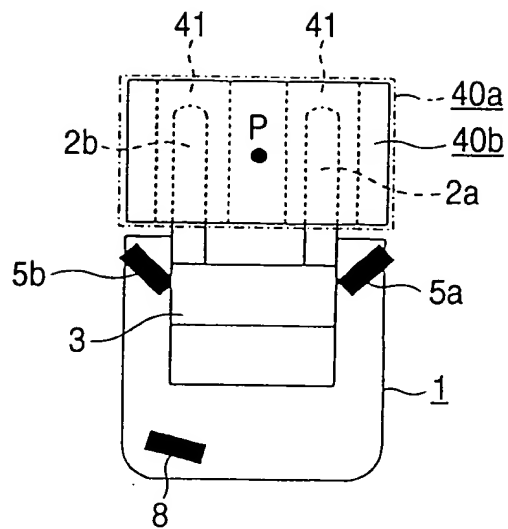


FIG. 16

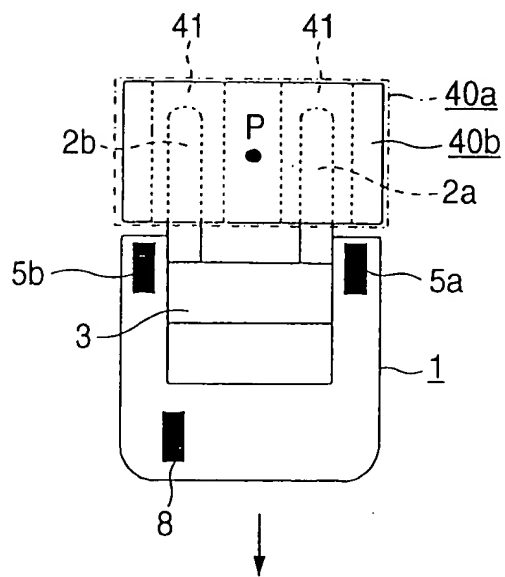


FIG. 17(a)

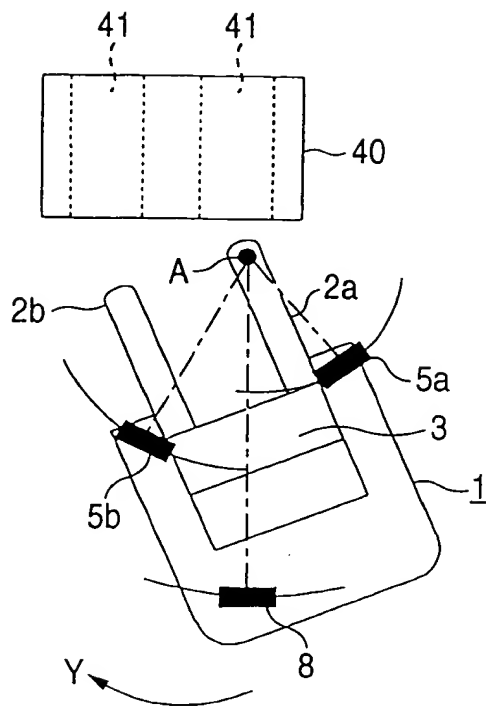


FIG. 17(b)

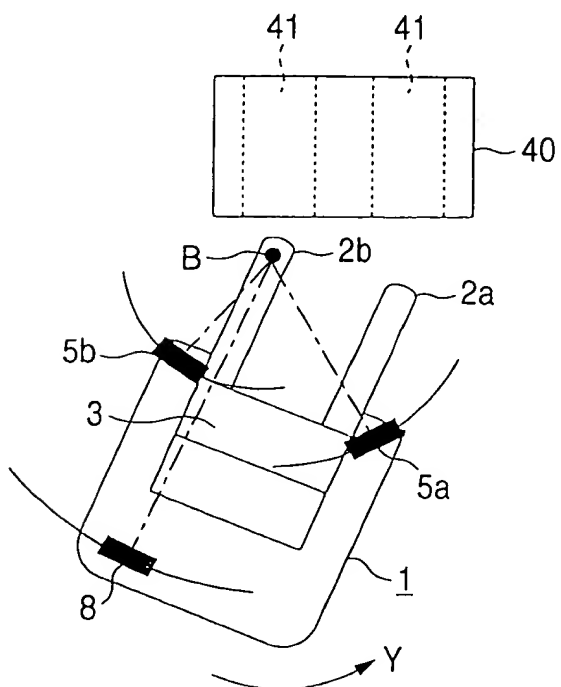




FIG. 18

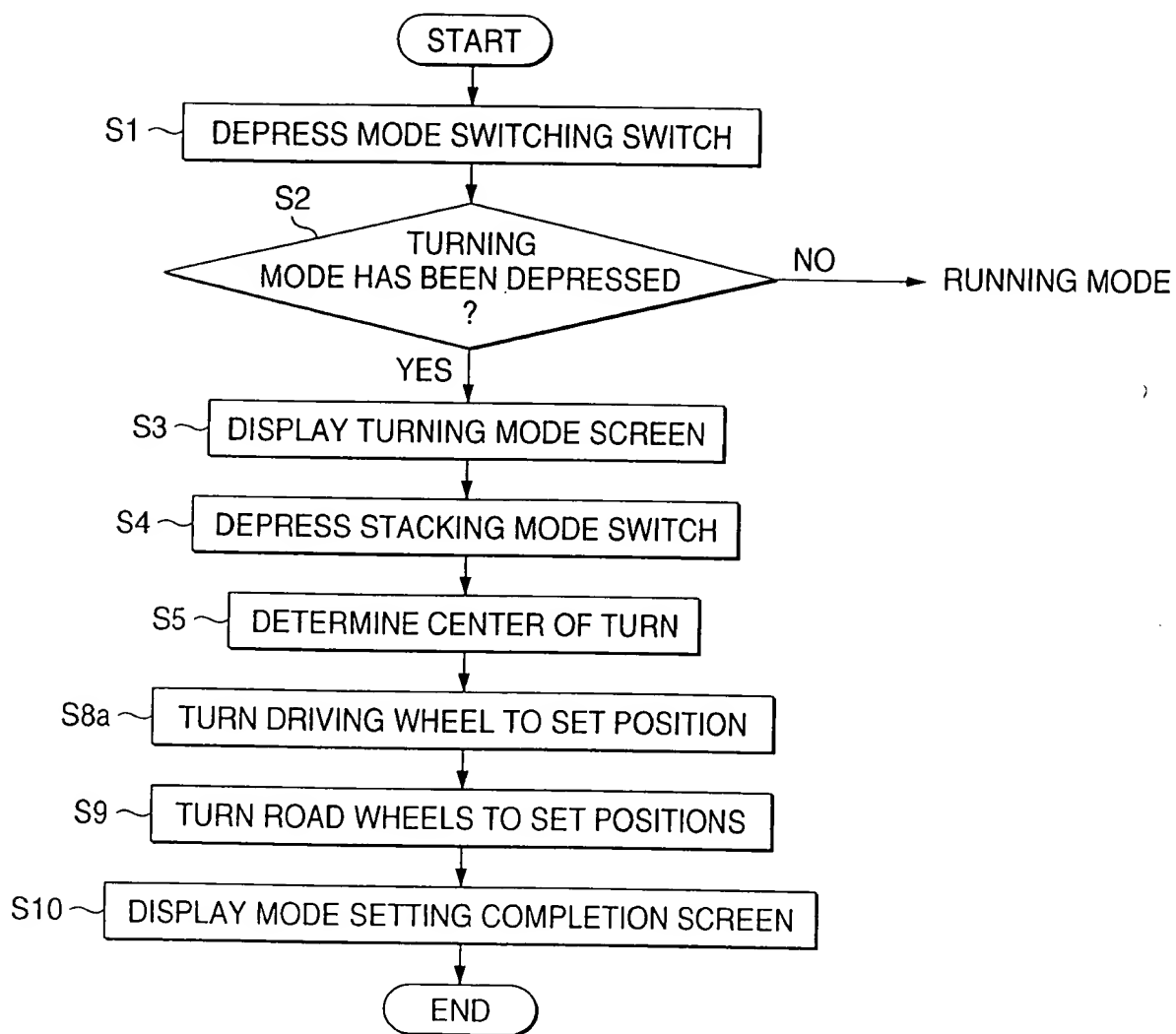




FIG. 19(a)

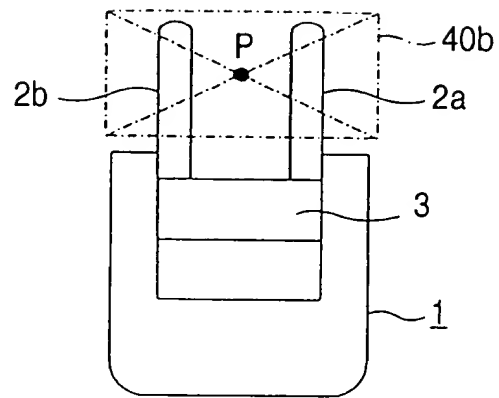


FIG. 19(b)

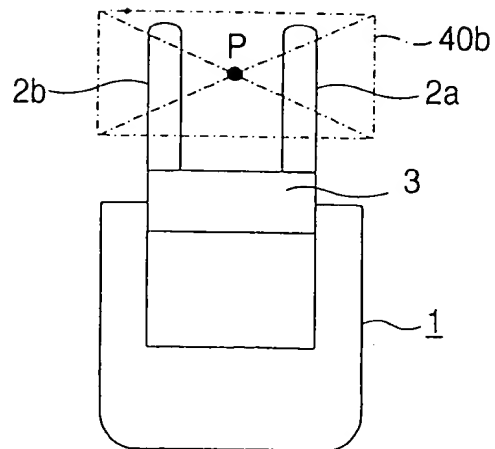


FIG. 20

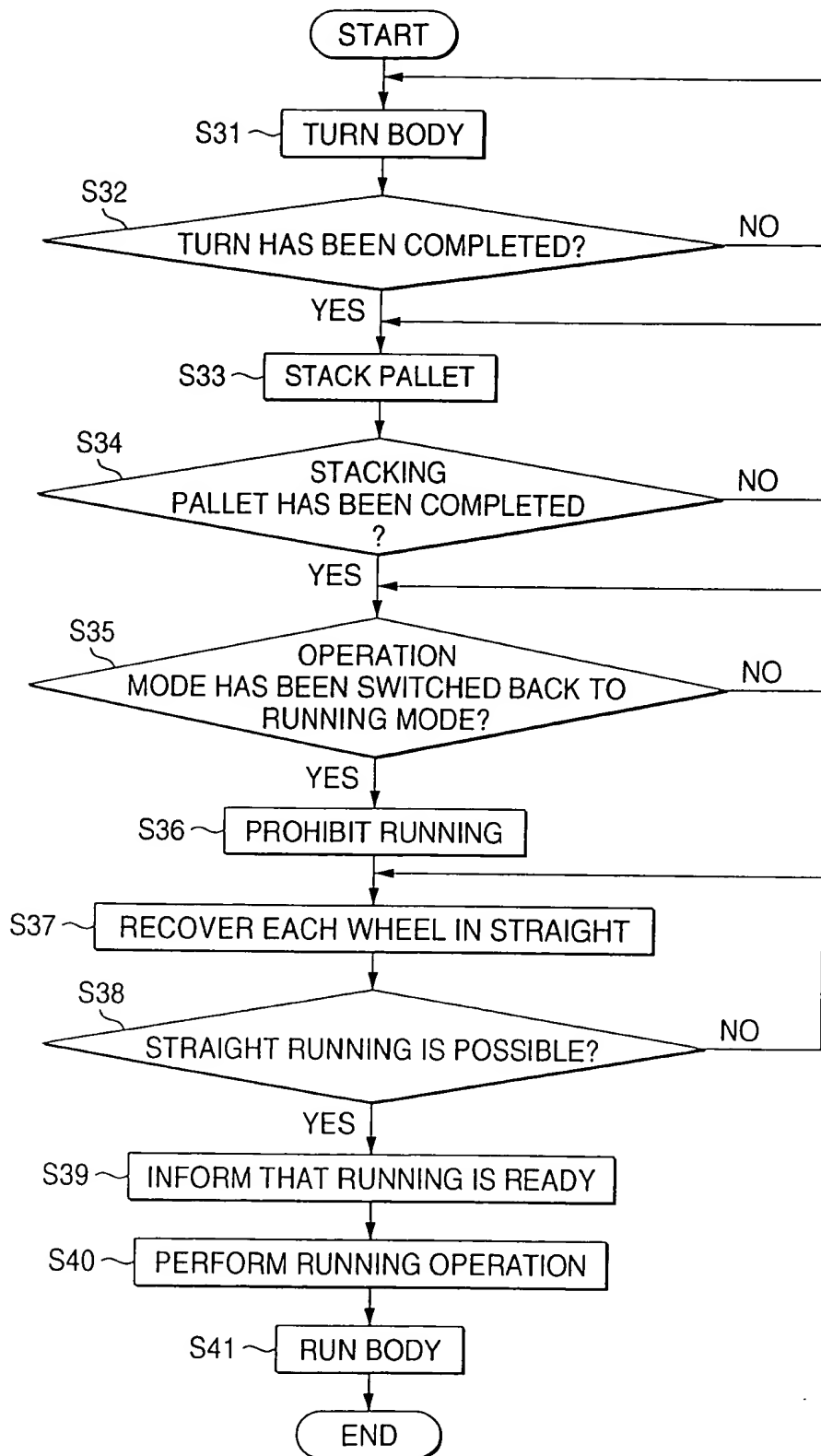


FIG. 21(a)

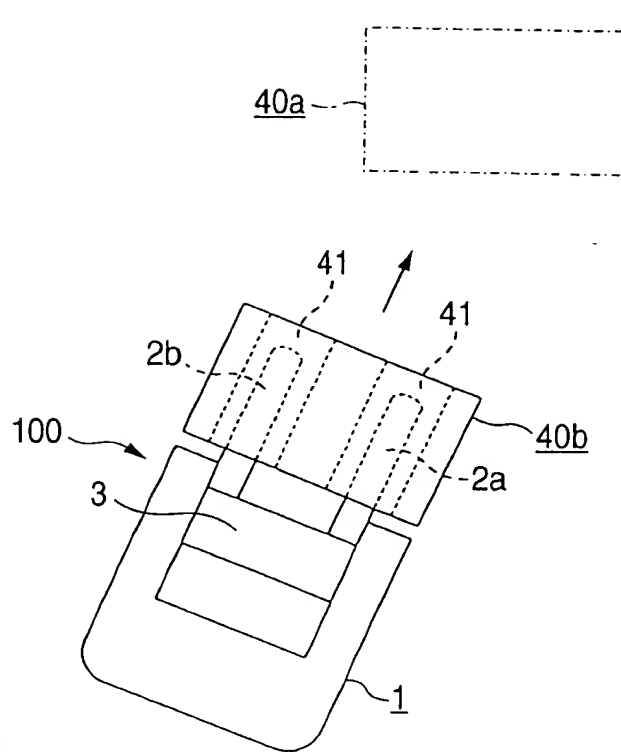


FIG. 21(b)

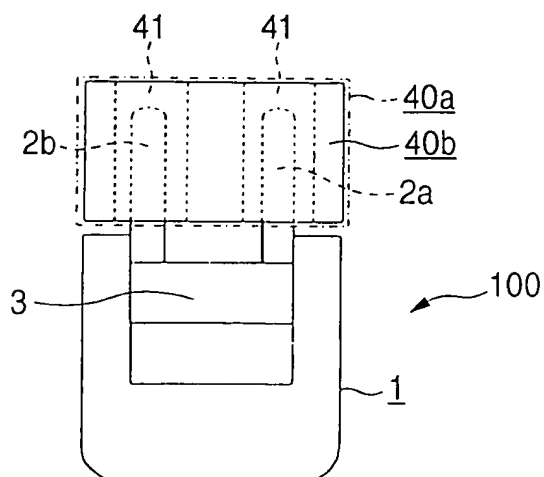




FIG. 22

